2015
Fire Weather Annual Summary

San Joaquin Valley Fire Weather District
Hanford, CA

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I. Summation of the 2015 San Joaquin Valley/Hanford Fire Weather Season

The National Weather Service in Hanford began its full fire season activities on April 20th, preparing two narrative forecasts and zone trend forecasts seven days a week. This continued through November 22nd.

January

January 2015 was drier and warmer than normal as the main storm track remained well north of the region for most of the month. Kern County fared better with precipitation than the remainder of central California as the weaker southern branch of the jet stream brought significant rainfall to Kern County on January 11th. Otherwise a ridge of high pressure dominated the weather pattern for most of the month until another system brought precipitation across the region on January 27th. In the San Joaquin Valley, cold arctic air settled into the valley for the first few days of January while fog and low clouds limited warming in the middle of the month. Despite this, temperatures were 2-3 degrees above normal. In the mountains and desert areas, temperatures averaged 3-6 degrees above normal during January.

February

The warm temperatures of January continued into February with temperatures averaging 3-6 degrees above normal for the month. A persistent ridge of high pressure dominated the weather pattern, allowing only a few storm systems into the region. The first of these storms moved through on February 6th and 7th, bringing up to 3 inches of rain across the Sierra Nevada and foothills near Yosemite tapering to less than a half inch in the Tehachapi Mountains. However, snow levels were above 10,000 feet with this event. The next storm did not arrive until the 22nd. This storm was colder and brought 5 to as much as 20 inches of snow to elevations above 5000 feet. This storm also brought showers and thunderstorms to the San Joaquin Valley and foothills. Rainfall amounts ranged from 0.3 to 1 inch in the San Joaquin Valley and 1 to 1.5 inches in the Sierra Nevada and foothills below 5000 feet.

March

March 2015 continued to be exceptionally warm with temperatures across the region averaging 5-8 degrees above normal for the month. It was the warmest March on record for Fresno and the 3rd warmest for Bakersfield. It also continued to be much drier than normal, with Fresno having the 6th driest March on record. The few storm systems that moved through the region brought only scattered showers, mainly to the higher terrain. The only storm to bring noteworthy precipitation moved through on March 1st and 2nd. The storm dropped down the coast, bringing most of the precipitation across Kern County where around three-quarters of an inch of rain fell, with 2 to 5 inches of snow above 5000 feet in the Tehachapi Mountains. What little snow fell in the higher elevation of the Sierra melted quickly due to the unusually warm temperatures. By April 1st, the snowpack over the Sierra was only at 5 percent of normal.

April

The dry weather continued in April 2015 with only two significant weather systems, one on the 6th and 7th and another on the 25th. The weather pattern continued to be dominated by a strong ridge of high pressure with above normal temperatures. By the end of April, the snowpack in the Sierra was only 3 percent of normal.

May

Precipitation for May 2015 was slightly above normal, especially over the mountains as several storm system moved through the region during the month. Storm system on the 7th and 8th and also on the 14th brought snow to elevations above 6000 feet, with as much as 10 to 20 inches of snow at the higher elevations. In the lower elevations, showers and thunderstorms produced a quarter to half inch of rain with a few areas getting as much as an inch with the thunderstorms. Am trough of low pressure lingered over the region from the 15th through the 20th, bringing scattered showers and isolated thunderstorms. This was followed by another storm system that brought a bit of subtropical moisture in the form of showers and thunderstorms across the region on the 21st and 22nd with the showers continuing across Kern County on the 23rd. Due to the clouds and precipitation, temperatures over central California ended up slightly below normal. However, snowpack was completely depleted by the end of May.

The drought continued to worsen during May and June with lakes and reservoirs remaining at historically low levels. The 2013-2014 rainfall season (July 1-June 30) ended with Fresno being the 2nd driest season on record with 4.81 inches of rain (normal 11.5 inches). Bakersfield was the 3rd driest on record with 2.41 inches of rain (normal 6.47 inches).

June

June 2015 had several days when subtropical moisture from the remnants of hurricanes was drawn northward into the region. Due to the convective nature of the precipitation, rainfall amounts were highly variable. Kern County was the hardest hit with this moisture, especially between the 9th and the 13th. During this time thunderstorms produced very heavy rain (about 2 inches per hour) that resulted in flooding and mudslides in the Taft, Frazier Park, and Tehachapi areas.

June was also a very warm month, with temperatures averaging well above normal with many days of triple digit temperatures across the San Joaquin Valley, the foothill, and the Kern County desert. Fresno had its 3rd warmest June on record while Bakersfield was the 4th warmest on record.

July

A ridge of high pressure centered near the Four Corners region along with a weak low pressure system off the southern California coast allowed subtropical moisture to be drawn northward into central California the first few days of July 2015. Thunderstorms brought gusty winds and frequent lightning on July 1st and 2nd with only locally heavy rainfall. Another low pressure

system developed over the eastern Pacific July 6th and moved inland by July 9th. This system brought additional thunderstorms with up to a half inch of rain in the San Joaquin Valley and as much as 1.5 inches in parts of the Sierra Nevada. The air was cold enough aloft with this system to produce 3 inches of snow over the highest elevations of Yosemite National Park.

Another surge of tropical moisture, from the remnants of Hurricane Dolores, brought numerous showers and thunderstorms to the mountains and desert on the 18th through the 21st, while only isolated thunderstorms developed in the San Joaquin Valley. Heavy rain with the thunderstorms caused flooding along with mud and debris flow in the Tehachapi and Frazier Park areas of Kern County on July 18th and 19th. The threat of flash flooding spread into the Sierra Nevada and Foothills on the 20th and 21st where there was flash flooding near North Fork and mud and debris flow near El Portal just west of Yosemite National Park. Monsoonal moisture pushed into the region again on July 30th and 31st, but was high based and produced more lightning than rain, sparking wildfires in the Sierra.

Overall, July 2015 was wetter and slightly cooler than normal. Fresno had the wettest July on record while Bakersfield was the 6th wettest on record.

August

August was characteristically dry as a southwesterly flow aloft resided over the region for much of the month. Monsoonal moisture only pushed into the region twice during the month. The first of these intrusions was associated with the remnants of Hurricane Guillermo and produced only isolated showers and thunderstorms on August 4th and 5th. The second intrusion occurred on August 25th and 26th and again produced only isolated thunderstorms over the Sierra crest and sprinkles in the Kern County Mountains. Temperatures averaged slightly above normal for the month, with several periods of triple digit temperatures in the San Joaquin Valley, Sierra Foothills, and Kern County Desert. Several wildfires continued to burn through the month of August, most notably the Rough fire and the Cabin Fire.

September

Above normal temperatures and dry conditions dominated during the month of September as a ridge of high pressure remained over the region. Triple digit temperatures occurred on numerous days in the San Joaquin Valley, lower Foothills, and Kern County desert areas.There were three brief influxes of monsoonal moisture. The most significant was associated with the remnants of Hurricane Linda on September 14th and 15th. The showers associated with this surge of moisture brought a wetting rain to much of the higher terrain, with up to seven tenths of an inch of rain in the wettest locations of the Sierra Nevada. The other two intrusions of monsoonal moisture affected primarily Kern County. On the 9th, isolated thunderstorms developed over the mountains of Kern County, producing heavy rain and flooding near Pine Mountain Club and lightning started a wildfire near Tehachapi. On the 21st and 22nd, monsoonal moisture brought scattered showers and isolated thunderstorms primarily over the Kern County mountains and desert. The Rough fire continued to burn, becoming one of the 15 largest fires in California history.

October

During the first two days of October, a storm system that originated in western Canada tracked southwestward toward central California. As this storm approached from the north , it produced strong westerly winds on the west side of the San Joaquin Valley on October 3rd. Winds gusted as high as 70 mph immediately below the west side passes. Otherwise, this storm brought scattered showers across much of the area on the 3rd and 4th. Elevations above 9,000 feet in the Sierra received a dusting to as much as 4 inches of snow from this system. Otherwise, precipitation that fell from this system was generally light with the exception of the Kern County Mountains and Desert which received the lion's share of it with rain amounts of a half inch to an inch in the desert and one to two inches in the mountains. Flooding occurred in the vicinity of Onyx and along a small segment of Highway 14 in the Kern County Desert on the 4th.

This storm moved into Arizona from the 5th through the 7th, but instead of continuing eastward like most storms normally do, this storm moved southwestward, crossed the Baja peninsula on the 9th and emerged out over the Pacific Ocean on the 10th. The storm stalled off the coast of northern Baja and tapped into a rich supply of tropical moisture. As the storm migrated toward Point Conception, showers and thunderstorms spread into Kern County on the 15th. Locally heavy rain produced flooding in the southern San Joaquin Valley south of Bakersfield by the early evening hours of the 15th and also caused flash flooding in the Kern County Mountains. A substantial amount of mud and debris flowed onto Highway 58 through Tehachapi Pass between 4 pm and 6 pm on October 15th, stranding vehicles along a two mile stretch of Highway 58. The mud was reportedly 4 to 6 feet deep along this portion of Highway 58 and up to 12 feet deep near the intersection of Willow Springs Road. This portion of Highway 58 remained closed for nearly a week. Additionally, mud and debris flows also occurred along Interstate 5 through the Grapevine during the late afternoon and evening hours of the 15th forcing closure of the freeway for nearly 24 hours. Thunderstorms that trained through this region during the late afternoon and early evening hours of the 15th produced one inch to as much as 4 inches of rain in just a couple of hours. Minor flooding also occurred in the southern San Joaquin Valley south of Bakersfield in the city of Lamont. Rain amounts elsewhere across the region were significantly lighter and ranged from just a few hundredths to around a half inch.

A cold frontal passage during the early morning hours of the 18th was marked by a line of showers and thunderstorms as it moved across the San Joaquin Valley into the Sierra foothills. Thunderstorms produced nearly an inch of rain near Visalia and Tulare, resulting in localized flooding. The remainder of the San Joaquin Valley received little if any rain from this cold front. However, this front also brought beneficial precipitation to the foothills and higher elevations of the Sierra on the morning of the 18th. Rain totals in these areas ranged from a quarter of an inch to just over an inch in the Sierra foothills and a half inch to nearly two inches over the higher terrain. Another cold front that approached from the Pacific a week later tapped into some high level tropical moisture from Hurricane Olaf east of the Hawaiian Islands. This cold front finally moved inland and brought light precipitation to much of the region the 28th. Rain amounts from this cold front were generally less than a quarter of an inch although the wettest locations in the foothills and higher elevations of the Sierra received nearly four tenths of an inch of rain. Despite the heavy rainfall in places during October, precipitation remained below normal for the month across much of the district and temperatures averaged above normal.

November

November 2015 began with a significant storm moving through the region on the 2nd. With its approach, gusty winds kicked up a considerable amount of dust in the southern San Joaquin Valley. The dust was quickly settled by a wetting rain later that afternoon as the storm moved inland. The cold front associated with this storm dragged its feet southward across the central California interior on the 2nd. The storm dumped a foot or more of snow in the Sierra above 7,000 feet and 1 to 3 inches of rain in the foothills. Rain amounts in the San Joaquin Valley ranged from just under a tenth of an inch at the south end to 1.5 inches in Merced County. Exactly one week later, another storm, this one originating in the Gulf of Alaska, tracked through central California. By the time this storm exited into the Great Basin on the 10th, it left up to a foot and a half of new snow over the higher elevations of the Sierra with generous rainfall in the lower elevations. In the San Joaquin Valley, isolated thunderstorms with small hail developed in the colder, unstable environment that afternoon. Rainfall from this storm system in the San Joaquin Valley ranged from just a few hundredths at the south end to around a half inch north of Fresno County. The west slopes of the Sierra, including the lower foothills, received a half inch to 1.25 inches of rain.

A colder and wetter storm system arrived on November 15th. The cold frontal passage during the morning of the 15th was accompanied by precipitation, even in the Kern County desert. The front was followed by instability showers and isolated thunderstorms during the afternoon and evening hours of the 15th. The air was cold enough to lower snow levels to pass level in the Kern County Mountains during the early morning hours of the 16th where a small, slushy accumulation of snow fell over the Grapevine. In the Sierra, 8 to 12 inches of snow accumulated above 5,000 feet. An Arctic air mass moved into central California behind this storm and set the stage for the first frost of the season in the San Joaquin Valley on the morning of the 17th. These storms brought enough rain and snow to the region to bring high fire season to a close on November 22nd.

On the 21st a strong ridge of high pressure moved inland and produced a dry offshore flow across central and southern California. The warming trend peaked on the 23rd with some southern San Joaquin Valley locations topping the 80-degree mark. But it would be less than 24 hours before another Gulf of Alaska storm ushered in another unseasonably cold air mass. On the evening of the 24th, a cold front brought relatively light precipitation. Snow levels fell rapidly behind it to between 2000 feet and 3000 feet. By midday, November 25th, snow amounts ranged from a dusting to a few inches at about 2000 feet with as much as 7 inches over the higher elevations of the Sierra.

In summary, November 2015 averaged slightly cooler than normal. Precipitation for the month was varied and ended up below normal for the month across much of Kern County and Kings County in addition to the higher elevations of the Sierra from Fresno County northward. The remainder of the area averaged slightly wetter than normal. The snowpack over the southern Sierra was more respectable this November compared to the past few Novembers and averaged about 78 percent of normal as of December 1st.

December

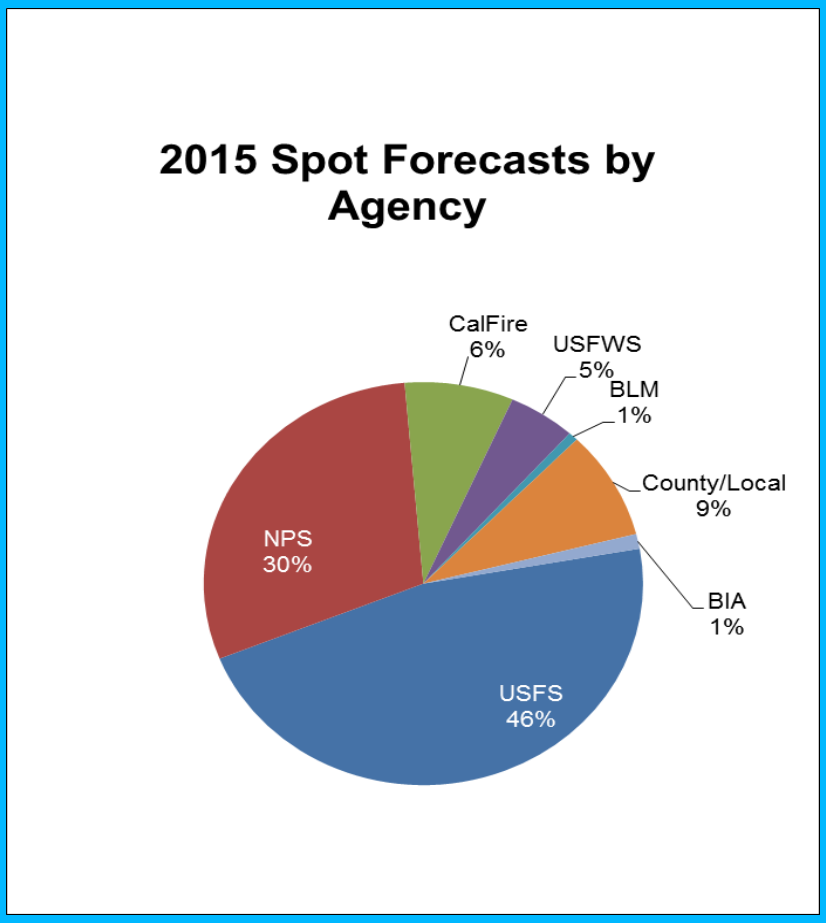
December 2015 brought a total of five storms that dropped out of the Gulf of Alaska, producing generous snow over the high Sierra and beneficial rain to mainly the east side of the San Joaquin Valley and adjacent foothills. By the end of the month, the snowpack over the southern Sierra increased to about 86 percent of normal. Precipitation throughout central California, with respect to normal, was highly varied. Downslope westerly winds associated with each storm system that traversed central California helped minimize precipitation on the west side of the San Joaquin Valley and the Kern County desert. Precipitation in these rain shadowed areas ended up below normal while the foothills and higher elevations of the Sierra were much wetter than normal.

Very cold air moved into the region in the wake of storm systems on the 14th and Christmas Eve, resulting in several nights of frost and sub-freezing temperatures in the Kern County Desert and the San Joaquin Valley and very cold temperatures in the mountains as well. Despite the many cold nights that December brought, daytime highs continued to be slightly warmer than average. Thus, the monthly average temperature ended up very close to normal. As for the calendar year, 2015 ended up being the 2nd warmest on record in Bakersfield and the 4th warmest on record in Fresno.

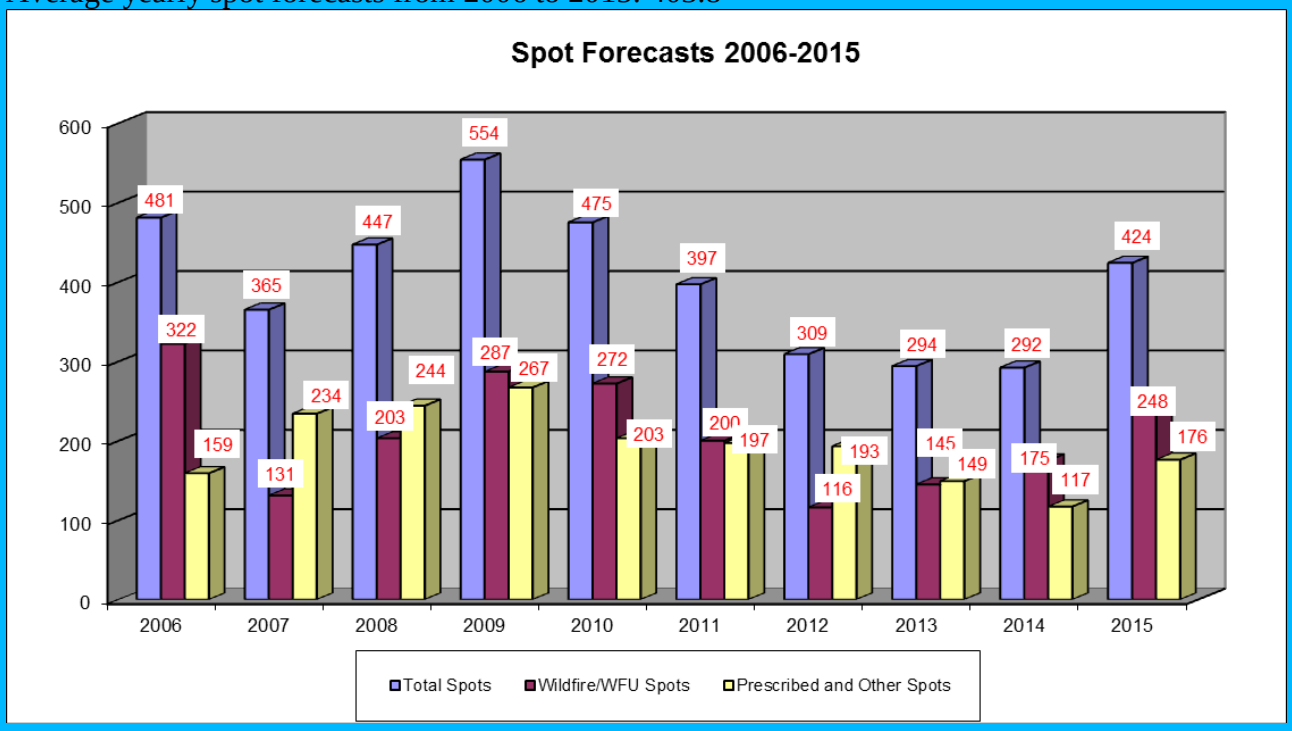
II. Spot Forecasts

The following Spot Forecasts were prepared by the National Weather Service San Joaquin Valley Office in 2015:

Total Spots: 424
RX spots: 138
Wildfire spots: 248
Hazmat/SAR spots: 37
Monthly average: 35.3



Average yearly spot forecasts from 2006 to 2015: 403.8



III. ATMU Dispatches

The San Joaquin Valley Office responded to the following Incident Meteorologist (IMET) requests during 2015:

Incident Name	IMET	Dispatch Dates	Fire Weather District
Lake Fire San Bernardino NF	Dan Harty	6/25/15 – 7/5/15	San Diego, CA
Sockeye Fire Alaska State Forestry	Jim Dudley (T)	6/17/15 – 6/22/15	Anchorage, AK
Anaconda Creek Fire Alaska State Forestry	Jim Dudley (T)	6/22/15 – 7/2/15	Fairbanks, AK
Willow Fire Sierra NF	Dan Harty	7/26/15 – 8/7/15	Hanford, CA
Cabin Fire Sequoia NF	Jim Dudley	8/1/15 – 8/9/15	Hanford, CA
Rough Fire Sierra NF	Jim Dudley	8/13/15 – 8/26/15	Hanford, CA
Avery Complex Idaho Panhandle NF	Jim Dudley	9/2/15 – 9/14/15	Spokane, WA

Total IMET days out of the office: 76

IV. Teaching Assignments

The San Joaquin Valley Office participated as instructors at the following Courses in 2015:

Course Name	Location	Agency Served	Instructor
S-290	Bakersfield, CA April 13-14	Kern County Fire Academy	Dan Harty
S-290	Yosemite, CA June 8-9	Yosemite Fire	Cindy Bean
RT-130 Presentations			
	Prather, CA March 10	Sierra NF	Dan Harty
	Springville, CA April 8	Sequoia NF	Cindy Bean
	Prather, CA May 19	Sierra NF	Cindy Bean
	Clovis, CA April 9	Sierra NF Fire Module Meeting	Cindy Bean

V. Training

The following training was completed by the San Joaquin Valley office in 2015:

IMET Workshop, April 2015	Dan Harty Jim Dudley

VI. 2014 Red Flag Warning Verification

Note: warnings are issued for individual forecast zones.
e.g., a Red Flag Warning issued for 3 zones will count as 3 warnings.

Total Events

Number of Red Flag Warnings issued: 0
Number of Red Flag Warnings verified: 0
Number of missed events: 0

Warnings preceded by a Fire Weather Watch: N/A
Watches not followed by a Warning: N/A

Probability of Detection (POD): N/A
False Alarm Ratio (FAR): N/A
Critical Success Index (CSI): N/A
Average Lead Time for Warnings: N/A
Watches: N/A